The oxygen-containing slag at the surface contact of the bath, does not come into contact with sufficient amount of molecules of carbon, and the free iron oxide of the slag now penetrates into the interior of the metal until it comes into contact with carbon. Thus gas bubbles originate in the interior of the metal. This, however, offers greater resistance to the gas than the lighter slag covering. Therefore, the gas-bubbles must assemble themselves together into large gas-bubbles before their buoyancy suffices for their overcoming the cohesion of the bath of iron. Then only are they able to throw the particles of iron on one side and to rise through the metal. Thus only large gas bubbles and in small multitude reach the slag, through which they pass undivided, whilst they carry with them the small gas bubbles contained in the latter. The slag thereby soon loses its frothy appearance and sinks down, but still gas bubbles rise up from the bath in regular streams and invest it with a deceptive similarity to a boiling fluid—the bath " boils."

A regular boil is of the greatest importance for the open-hearth furnace process. Firstly, the bath is thereby more intensely mixed throughout, and can react better than ever could possibly happen by the action of any kind of mechanical mixing devices whatever. Secondly, the heat exchanged between the flame and the bath takes place in a more active manner, in that the colder bottom layers of the bath are always again brought to the top and exposed to the action of the flame. Lastly, owing to the boil, the direct chemical action of the flame is strengthened which is essentially only interpolated, since the ascending gas bubbles lift particles of the metal above the slag covering and bring them, if only for a moment, in direct contact with the flame. But the role repeats itself uninterruptedly; thus in spite of the apparently protective slag covering there takes place during the whole period of the lively boil a direct transference of oxygen from the gases of the flame to the metal. It thus in consequence forms scale which, by sinking back of the particles of iron through the slag covering, is washed off and dissolved in it, and in consequence becomes active on the carbon as dissolved iron oxide.